Idaho State Department of Agriculture
Division of Agricultural Resources

Hog Creek, Scott Creek, Jenkins Creek and Warm Springs Creek Year Two Water Quality Monitoring Report April 2000 through March 2001

Prepared for
Weiser River Soil Conservation District
Weiser River Watershed Advisory Group

Prepared by:
Kirk Campbell
Idaho State Department of Agriculture

ISDA Technical Results Summary #W-3

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Introduction

This technical report presents the second year (2000-2001) of results for Weiser Flat water quality monitoring conducted by the Idaho State Department of Agriculture (ISDA). As with the first year of monitoring (ISDA Tech. Result Summary #W-2) the second year was conducted to support the Weiser Soil Conservation District (SCD), Weiser Technical Advisory Group (TAG), and the Weiser Watershed Advisory Group (WAG) in the Total Maximum Daily Load (TMDL) process. This program was made possible by state funding that allows ISDA to support the Soil Conservation Commission (SCC) and the local Soil Conservation Districts (SCDs) with the implementation phase of the TMDL process. This monitoring program will help assist in understanding the source and transport of contaminates from various agricultural practices. In addition, information gathered will help fill data gaps, help with pollutant load allocations and insure that Best Management Practices (BMPs) are established in areas of need and are functioning properly for pollutant reductions.

Background

The same four creeks monitored during the first year were continued for the second year. The 303(d) listed creeks were Hog Creek, Warm Springs Creek, and Scott Creek. Jenkins Creek, which is not listed, was again added to the monitoring program for evaluation. The 303(d) creeks are listed as having excessive sediment and nutrients impacting their beneficial uses. The four creeks empty into the Snake River and reside in the Snake River/Brownlee Reservoir hydrological unit code (HUC) 17050201.

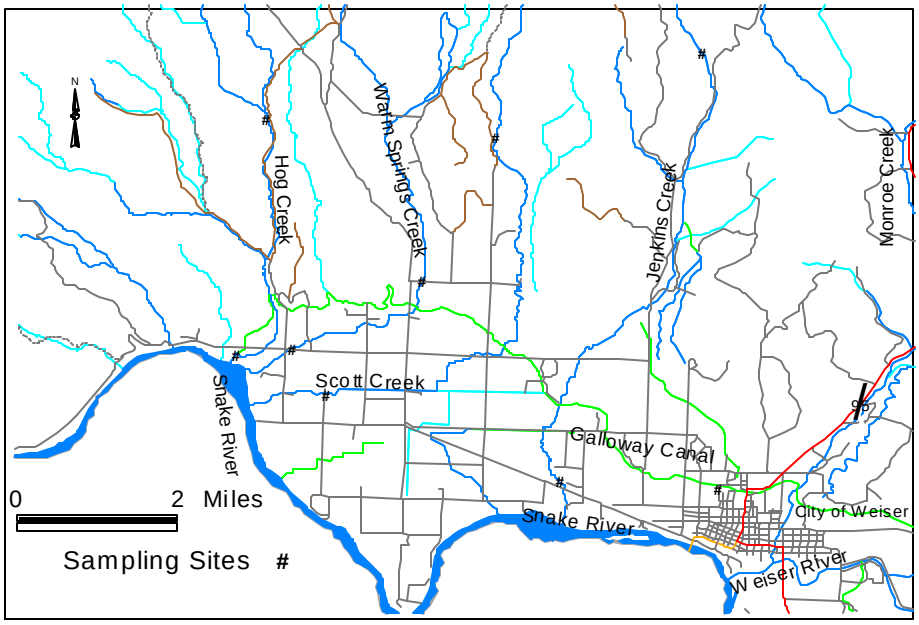

Figure 1. Weiser Flat site map

Program Objectives

ISDA will work in cooperation with the Natural Resource Conservation Service (NRCS), Soil Conservation Commission (SCC), Idaho Association of Soil Conservation Districts (IASCD) and Idaho Department of Environmental Quality (IDEQ) to complete the following objectives.

- Evaluate the water quality and discharge rates at various locations within each subwatershed.
- Determine which areas contribute the greatest level of pollutant loading.
- Relate pollutant loading to areas that may require BMP implementation under the TMDL process
- Provide pre-BMP (background) water quality data for data comparison after implementation
- Use this data for public information and education

Monitoring Schedule and Site Description

Monitoring was conducted on a bi-weekly schedule during the months of April through October 2000 and once a month during the late fall and winter months (November 2000 through March 2001). Two monitoring stations were established on each of the four creeks. When possible, background sites were established above agricultural row crop areas to determine contributions from the upper subwatersheds. The second group of stations were established below row crop acreage prior to each creek entering the Snake River (Figure 1).

For the second year of monitoring, all of the station locations were the same with the exception of Scott Creek Up. During the 1999-2000 monitoring the Scott Creek upper station was located below some agricultural activities and was not in the upper subwatershed. The second year this site was established further up in the sub watershed above any major agricultural activities (Figure 1). In addition to the eight (8) creek locations, one additional site was established on Galloway Canal. The Galloway site was selected to evaluate the quality of water prior to entering the study area.

For this monitoring year (2000-2001), the three upgradient stations (Hog Creek, Scott Creek and Warm Springs Creek) went dry or became stagnant during the month of July. Hog Creek Up was sampled throughout the summer because the station location was below where Galloway diversion water enters Hog Creek. All of the upgradient stream sites began to discharge again near the end of October or early November.

General Results

Average concentrations, for evaluated constituents, were compared (for both sampling seasons) to some literature values that have been proposed or used in TMDLs established in Idaho (Lower Boise TMDL 1998, USEPA 1987; Cline 1973). The concentrations at Scott Creek Up for the 2000-2001 monitoring season reflect the relocation of the site further up into the watershed above any major agricultural activities. On average the concentrations for total suspended solids (TSS) and total phosphorus declined at most downstream stations during the second year of monitoring (Table 1). The concentration decline could be the result of a much drier spring and winter during the 2000-2001 monitoring season when compared to precipitation records for the 1999-2000 season. In addition, from visual observations it appeared that the crop rotation for the second monitoring season (2000-2001) included less sugar beets and onions with more alfalfa and grain crops.

Total Suspended Sediment

During the 2000-2001 monitoring season, the (TSS) load

Site	TSS mg/L		Total-P mg/L		Nitrate mg/L	
TMDL proposed concentrations	**50**		**0.10**		**0.30**	
	1999/2000	2000/2001	1999/2000	2000/2001	1999/2000	2000/2001
Jenkins Up	6	6	.14	.14	.41	.36
Jenkins Down	184	120	.54	.29	2.98	3.9
Scott Up	49	2.8*	.21	.09*	3.67	0.04*
Scott Down	120	85	.34	.29	1.04	.89
Hog Up	37	26	.15	.15	.24	.23
Hog Down	25	19	.19	.21	.39	.26
Warm Up	5.3	2	.17	.18	.27	.24
Warm Down	110	54	.27	.23	.79	1.59
Galloway Canal	29.5	25.4	.15	.13	.26	.12

*Scott Up new location further up in the subwatershed for 2000 and 20001 monitoring season

Table 1. Average concentrations for 1999-2000 and 2000-2001 compared to TMDL literature values.

(from all four creeks combined) reaching the Snake River was 16,680 lbs/day. This is a reduction of approximately 46% when compared to the average daily load of 31,274 lbs recorded during the 1999-2000 season. The largest reductions occurred at Scott Creek Up (94%) and Warm Springs Up (90%). The large decrease for Scott Creek Up may be related to the site being moved higher up into the subwatershed. For Warm Springs Up there were fewer samples collected in 2000-2001 (n = 11) then in 1999-2000 (n = 15). In addition, the average discharge rate (0.72 cfs) was approximately two-thirds less when compared to 1999 season (2.67 cfs). All of the upstream and down-

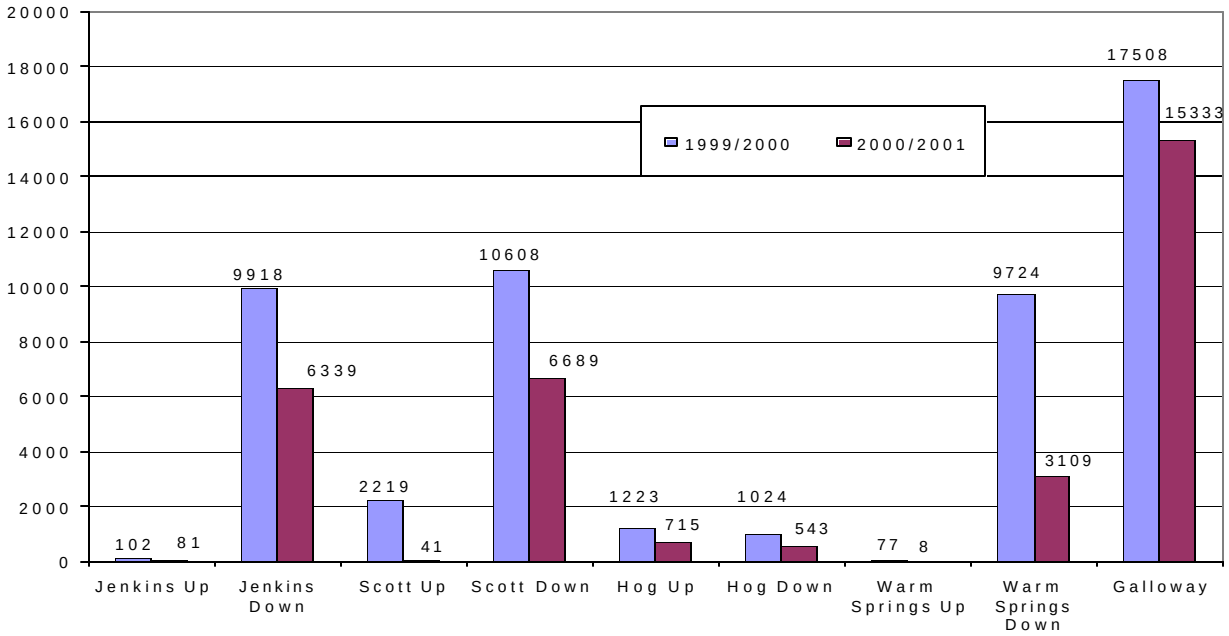

Figure 1. TSS average load (lbs./day) 1999-2000 and 2000-2001

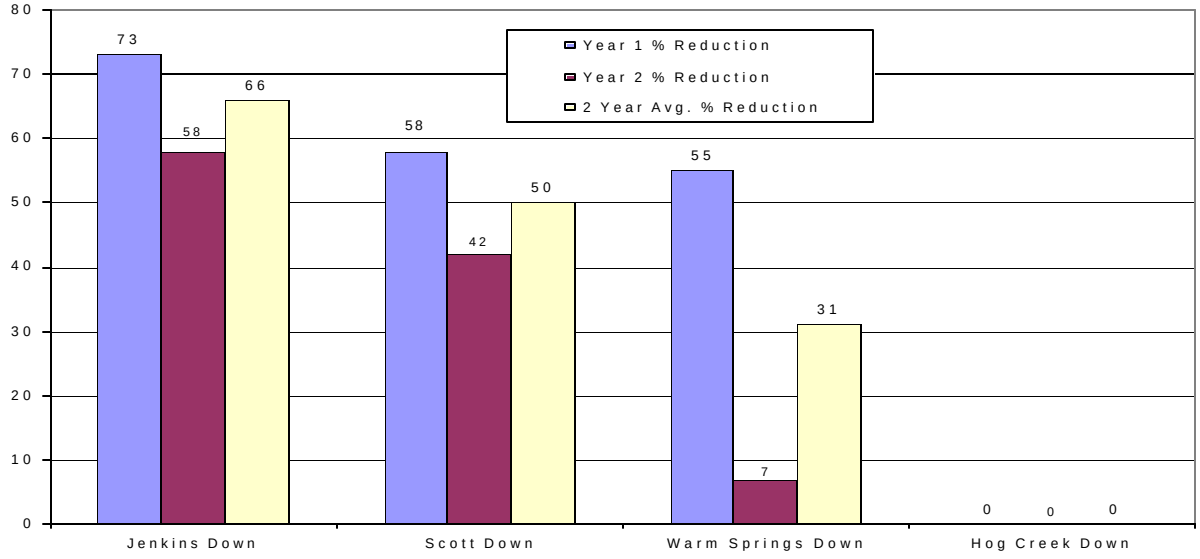

Figure 2. Percent reductions needed to meet 50 mg/L concentration for TSS

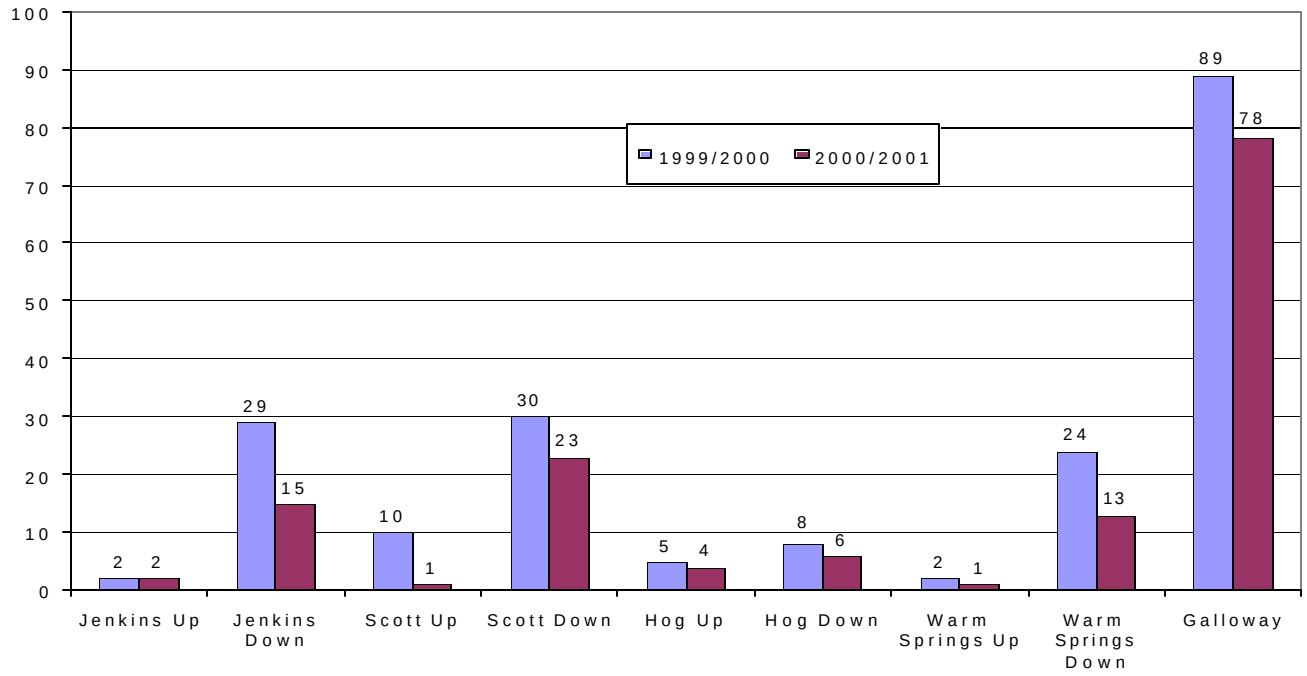

Figure 3. Average yearly loads (lbs/day) total phosphorus

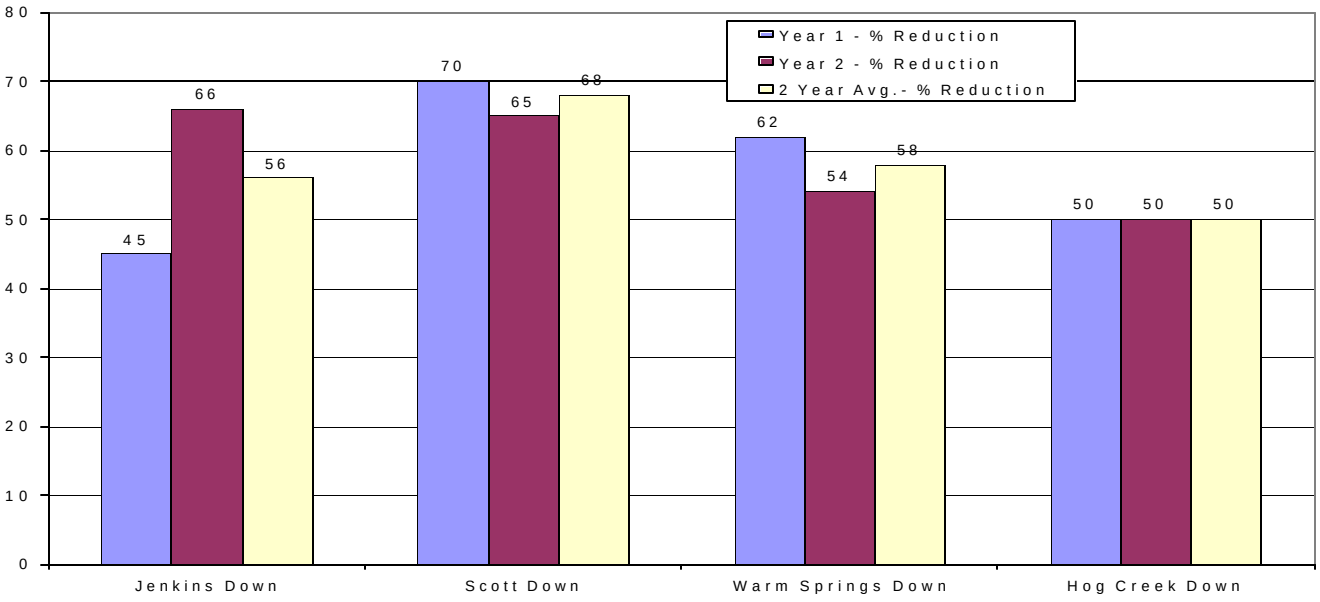

Figure 4. Percent reduction to achieve EPA recommended concentration for total phosphorus of 0.10 mg/L

stream sites showed reduction in TSS load for the 2000-2001 season (Figure 1). Figure 2 displays the average TSS reduction necessary to meet a TMDL concentration of 50 mg/L, based on 1999 through 2001 data.

Total Phosphorus

Total phosphorus loads also decreased for the 2000-2001 monitoring season. The load for the 2000-2001 season was 57 lbs/day an overall reduction of 37% when compared to the 91 lbs/day recorded during the 1999-2000 season (Figure 3). Environmental Protection Agency (EPA) criteria for total phosphorus concentration, for streams not discharging directly into Lakes or Reservoirs, should not exceed 0.10 mg/L. Using this concentration, the average load reduction for total phosphorus (over the two seasons) was Scott Creek down (68%), Warm Springs down (58%), Jenkins down (56%) and Hog Creek down (50%) (Figure 4). The discharge rate from the creeks also decreased during the second year of monitoring. The two largest decreases in discharge occurred for Hog Creek (31%) and Warm Springs (35%). Scott Creek showed a 11% reduction in flow while Jenkins Creek showed only a slight decrease (2%). The only parameter that didn't decrease during the

two year study was dissolved phosphorus. On average the dissolved phosphorus load for all of the creeks combined remained at 31 lbs/day.

Nitrate + Nitrite as Nitrogen

Nitrate + nitrite as nitrogen ($N0_3$+$N0_2$-N) average loads were up slightly from 339 lbs/day for 1999-2000 season to 377 lbs/day for the 2000-2001 season. Literature values indicate that N03 + N02-N should be limited to 0.30 mg/L or less to avoid degradation of water quality (Cline 1973).

With the exception of Jenkins Creek Up (0.36 mg/L) all of the upgradient sites average nitrate concentrations were below the 0.30 mg/L threshold. The Hog Creek downstream station (0.26 mg/L) was the only downstream site that was below the literature value for nitrate. Jenkins down (3.94 mg/L), Warm Springs down (1.59 mg/L) and Scott down (0.89 mg/L) all exceeded the threshold value. The 2000-2001 data indicates a load reductions for Jenkins Creek (92%), Warm Springs Creek (92%), Scott Creek (81%) and Hog Creek (0%) would be necessary to meet the threshold value for nitrate.

Bacteria

The four creeks monitored in the Weiser Flat are not listed on the Idaho 303 (d) list as having a bacteria problem that impairs their beneficial uses. As with the 1999-2000 monitoring season, all four creeks during the 2000-2001 season at times exceeded the state's standard for Escherichia Coli (*E.coli)* bacteria (IDAPA 58.01.02 sect. 251). The state standard for *E.coli* is 406 CFUs (colony forming units) detected at any one time. The value of 406 CFUs is the trigger level for additional sampling (minimum of five samples collected over a 30 day period) to calculate a geometric mean. The state standard for the *E.coli* geomean is 126 CFUs. Table 2 below indicates one time exceedances (shaded red) for Ecoli during the 2000-2001 monitoring program.

The actual total exceedances increased slightly from the 1999-2000 season (48) to the 2000-2001 season (51). The site that showed the largest increase in bacteria hits was Scott Creek down. For the 1999-2000 season Scott Creek had five exceedances while eleven were noted during the 2000-2001 season. At this time there is no clear explanation for the increase in bacteria concentrations for Scott Creek down.

Conclusions

The four creeks located within Weiser Flat all indicate that water quality impacts have occurred due primarily to anthropogenic activities. The impacts occur primarily in the lower subwatershed that is dominated by agricultural activities. In addition, this area is highly variable when it comes to pollutant loading based primarily on crop rotation, irrigation management, grazing management (upper subwatershed), and meteorological conditions. The data

Date	Jenkins Down	Jenkins Up	Hog Down	Hog Up	Warm Down	Warm Up	Scott Down	Scott Up	Galloway
4/5/2000	80	<10	70	50	110	20	20	<10	no flow
4/19/2000	300	60	140	100	160	120	280	220	100
5/4/2000	260	620	840	100	280	200	840	280	100
5/17/2000	820	260	600	480	1400	220	680	40	380
6/1/2000	640	160	1300	460	540	340	580	60	120
6/15/2000	3800	130	700	670	930	1800	600	170	100
6/26/2000	1000	100	1000	570	1000	1300	830	400	170
7/13/2000	200	170	300	870	130	no flow	1200	no flow	270
7/27/2000	3700	33	250	600	1300	no flow	1500	no flow	400
8/8/2000	2600	3400	430	370	100	no flow	1300	no flow	530
8/23/2000	>8300	2100	1900	2100	2200	no flow	1500	no flow	470
9/7/2000	170	70	300	100	470	no flow	500	no flow	200
9/21/2000	270	33	>8300	1800	270	no flow	430	no flow	400
10/4/2000	130	370	<10	130	400	no flow	170	no flow	270
10/17/2000	500	<33	33	no flow	230	no flow	70	no access	off
11/8/2000	33	33	170	66	<33	130	no flow	<33	off
12/7/2000	<33	<33	<33	66	33	minimal flow	no flow	no access	off
1/18/2001	<20	20	<20	40	no flow	<20	no flow	no access	off
2/14/2001	4	<3	23	23	no flow	150	no flow	9	off
3/13/2001	266	<33	42	2300	<33	<33	33	no access	off

Table 2. Bacteria results (*E-Coli*) for the 2000-2001 monitoring season in Colony Forming Units (CFUs)

variability from the first to second year indicates the need for further long term monitoring to accurately account for pollutant loading over time.

Reductions in total phosphorus and sediment (TSS) will likely be required to meet the Snake River Hells Canyon Complex TMDL requirements. The actual amount of reductions required for the Weiser Flat creeks will be addressed in the upcoming TMDL developed by IDEQ. A Jenkins Creek load allocation and load reduction determination should be addressed by IDEQ.

Average concentrations for TSS exceeded the 50 mg/L standard developed for the Lower Boise River at all lower stations except Hog Creek. All of the upper stations showed no exceedance of the 50 mg/L concentration. Averaging the two years of data, TSS reductions for Jenkins Creek (66%), Scott Creek (50%) and Warm Springs (31%) could be required. Hog Creek monitoring results indicated no required reduction for TSS load.

Comparing the two years of data indicated that year one required a greater reduction in total phosphorus than year two. Based on the EPA recommended concentration for total phosphorus (0.10 mg/L for streams not discharging directly into a lake or reservoir) the average percent load reduction for both years would be Jenkins Creek (56%), Scott Down (68%), Warm Springs (58%) and Hog Creek (50%).

Recommendations

To determine potential sources and their contributions to water quality impairment of Weiser Flat area streams ISDA recommends:

- The Weiser SCD work with the local NRCS, SCC, and ISDA staff to identify problems within Weiser Flat.
- Evaluation of stream bank conditions for severe down cutting, sloughing and loss of riparian function.
- Evaluation of irrigation water return systems to determine which ones are causing the majority of impacts to the creeks. Evaluation of irrigation practices within the Weiser Flat area.
- Assessment of impacts by large animal operations, either confined or otherwise, and their potential impacts on these systems.
- Identification of critical areas or critical activities best addressed by implementation of BMPs.
- The SCD, NRCS, SCC and ISDA work with landowners and cooperators to fund and implement projects that will improve the overall water quality within the watershed.

References

Cline, C., 1973. The effects of forest fertilization of the Tahuya River, Kitsap Pennisula, Washington. Washington State Dept. Ecology. 55p

USEPA. U.S. Environmental Protection Agency. 1987. Quality Criteria for Water. EPA Publication 440/5-86-001. U.S. Gov. Printing Office, Washington D.C.

(IDEQ) Idaho Division of Environmental Quality. 1998. Draft Lower Boise River TMDL, Subbasin Assessment, Total Maximum Daily Loads.